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Coppery Emerald Dragonfly

Somatochlora georgiana

State Status: **Endangered**
Federal Status: None

DESCRIPTION: The Coppery Emerald (*Somatochlora georgiana*) is a large insect of the order Odonata, sub-order Anisoptera (the dragonflies), and family Corduliidae (the emeralds). Emeralds of the genus *Somatochlora* are generally large, dark dragonflies with at least some iridescent green coloration, brilliant green eyes in the mature adults (brown in young individuals), and moderate pubescence (hairiness), especially on the thorax (section behind the head). The Coppery Emerald is distinctive among the *Somatochlora* in completely lacking the usual metallic coloration of the face, thorax and abdomen (section behind the thorax), and in the lack of green eyes, even in mature adults. The face and back of the head are pale brown in coloration, lighter on the face than on the back of the head. The large eyes, which meet at a seam on the top of the head, are chestnut-colored. The thorax is dull brown with two yellowish white stripes on each side of the thorax, which may become obscured with age. The slender, cylindrical abdomen is brownish yellow darkening towards the tip to a reddish brown. The wings of this species are transparent and, as in all dragonflies and damselflies, are supported by a dense system of dark veins. The Coppery Emerald is a strong flier, as are all species of *Somatochlora*, and rarely perches. When it rests on the branch of a tree or bush hanging vertically, the wings are held horizontally out from the body like those of an airplane.

Adult Coppery Emeralds range from 1.75 to 2 inches (45 to 49.5 mm) in length. Male and female Coppery Emeralds are similar in coloration and body form, though the females tend to be larger.

SIMILAR SPECIES: Coppery Emeralds are similar in size to other small species of *Somatochlora*, including the Ocellated Emerald (*S. minor*) and the Brush-tipped Emerald (*S. walshii*). However, the Coppery Emerald can be easily distinguished from these species by its lighter brown coloration (the other species are much darker) and its complete lack of metallic coloration. The shapes of the terminal appendages in the males (Nikula *et al.* 2003) and the vulvar lamina in the females are also distinctive (as shown in Needham *et al.* (1999)).

The nymphs can be distinguished by characteristics of the setae and the dorsal hooks on the abdomen as per the keys in Needham *et al.* (1999) and Soltesz (1996).

HABITAT: In Massachusetts, the Coppery Emerald has been found breeding in a small, sluggish stream through a White Cedar (*Chamaecyparis thyoides*) swamp. However, it more often has been encountered away from breeding sites in open habitats, such as forest clearings and dirt roads, feeding in swarms with other *Somatochlora* and darners of the genus *Aeshna*.

LIFE-HISTORY/BEHAVIOR: In Massachusetts, the Coppery Emerald has been encountered from late July to mid-August.

Although little is known about the life cycle of the Coppery Emerald in particular, information documented for other species is most likely applicable. During their complete life cycle, dragonflies go through two distinct stages, a nymph stage where they are wholly aquatic, and an aerial adult stage. Dragonfly and damselfly nymphs possess a unique feeding apparatus - a moveable, hinged labium, or lower lip, that is folded beneath the head of the nymph.

COPPERY EMERALD FLIGHT PERIOD

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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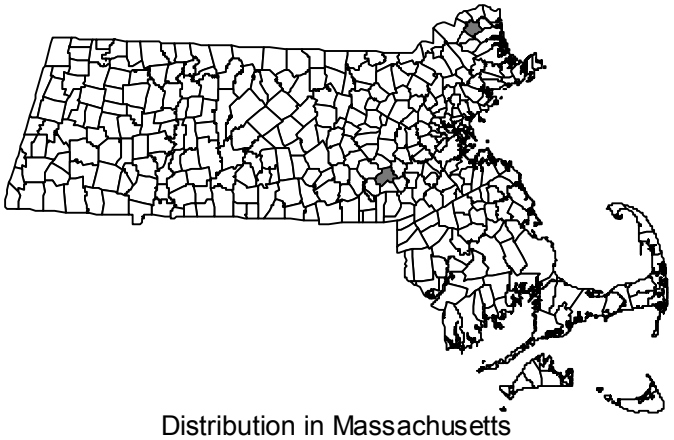
When a prey item is within reach, this lower lip can be rapidly extended forward to secure the hapless animal with hooks at the end of the labium. The prey item is then retracted to the mandibles of the nymph to be consumed. Prey is generally captured using an ambush technique, with the nymph remaining still until a potential meal comes within reach. Dragonfly nymphs are obligate carnivores, feeding on just about any animal of appropriate size. Prey include a wide variety of aquatic insects, small fish, tadpoles, and crustaceans.

It is not known how long it takes for the nymph of the Coppery Emerald to undergo full development. However, it generally takes about a year in similarly sized species. The final stage of development in dragonflies is emergence from the nymph to an adult. The nymph crawls out of the water to a secure support. Suitable supports include emergent vegetation, rocks and even man-made objects protruding from the water's surface. In Massachusetts, shed larval exoskeletons of the Coppery Emerald have been found clinging to submerged ferns no more than six inches off the surface of the water. When the adult emerges, it is very compacted. Body fluids are pumped into the wings and abdomen to help them expand. When they are fully extended and the adult's exoskeleton is sufficiently hardened, it takes its first flight. This maiden flight usually carries the individuals up into surrounding forest, where it spends several days maturing and feeding. There it is more protected from predators, weather, and other threats. Adult Coppery Emeralds can be found in fields and forest clearings which they patrol in search of small aerial insects, such as flies and mosquitoes, on which they feed. When not feeding, Coppery Emeralds rest hanging vertically from the branches of bushes and trees. The adult coloration is acquired and the dragonfly becomes sexually mature before returning to the breeding habitat to initiate mating.

At the breeding habitat, male dragonflies spend much of their time seeking out females. Males of many species of dragonflies are very territorial, vigorously defending their section of the pond or river against other males of the same species. Successful males may mate with more than one female during their brief adult lives, which may last only several weeks.

Upon locating a female, a male will grasp her thorax with his legs and secure her in back of the eyes with his terminal abdominal appendages. A receptive female then swings the tip of her abdomen, where her reproductive organs are located, towards the male's hamules (secondary sexual structures), located on the under side of the second abdominal segment, forming the "wheel position" with the male on top and the female below. The joined pair quickly flies off into the surrounding upland habitat to mate.

Following mating, oviposition occurs. Females of the genus *Somatochlora*, as well as all emeralds, oviposit alone and deposit their eggs directly into the substrate by tapping the tip of the abdomen on its surface while still in flight.



Distribution in Massachusetts
1977 - 2002
Based on records in Natural Heritage Database

RANGE: The Coppery Emerald is apparently very rare and local throughout its range. Despite its scarcity, it is generally distributed on the coastal plain of the southeastern United States, from Texas (one record) east to Florida and north to Virginia. There is a record from New Jersey, and the species was recently found at a site in Rhode Island.

POPULATION STATUS IN MASSACHUSETTS: The Coppery Emerald is listed as an Endangered species in Massachusetts. As with all species listed in Massachusetts, individuals of the species are protected from take (picking, collecting, killing, etc…) and sale under the Massachusetts Endangered Species Act. The species is known from only four locations in the state, and has not been recorded at two of these for almost 30 years. The Coppery Emerald is extremely rare and local in Massachusetts and requires further careful survey. The scarcity of the Coppery Emerald here may be due to the fact that Massachusetts lies at the northern limit of its range.

MANAGEMENT RECOMMENDATIONS: As for many rare species, exact needs for management of the Coppery Emerald are not known. As an inhabitant of small flowing streams, the Coppery Emerald, especially the nymph stage, is vulnerable to riverine impacts such as impoundment, flow alteration, and chemical pollution. The adults may also be particularly vulnerable in upland areas away from the breeding site, where they spend up to a week feeding and maturing. It is important to maintain natural upland areas required by the Coppery Emerald and all dragonflies for feeding and roosting as they develop into sexually mature adults.

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